SUBSTITUTE SPECIFICATION

TITLE OF INVENTION

OPAQUE SEE-THROUGH NON-REFLECTIVE CONVEX MIRROR

CROSS REFERENCE TO RELATED APPLICATIONS

This invention is related to my previous work expressed in US Patents 4,971,312 (ILLUSION APPARATUS issued November 20, 1990), 5,681,223 (TRAINING VIDEO METHOD AND DISPLAY issued October 28, 1997), 5,871,404 (OPTICAL BLOB issued February 16, 1999), the contents of each being incorporated herein by reference thereto. The Present Application is a continuation-in-part of US Patent Application Serial No. 09/624,483 entitled TRACKING MIRROR and filed on July 24, 2000 (having matured into US Patent No. 6,705,740 March 16, 2004), the contents of which are incorporated herein by reference, and the priority to which is claimed by the Present Application.

SUMMARY OF THE INVENTION

A perforated convex mirror with a non-specular concave face, being partially transparent and partially reflective, acts like a lightly silvered mirror, but it's concave face does not focus collimated light. A viewer looking at the convex face of the mirror will be able to see an ordinary mirror reflection while also simultaneously seeing what is on the other side of the mirror.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a cross section of a mirror embodiment where the perforations are physical holes.

FIG. 2 shows a cross section of a mirror embodiment where the perforations are transparent optical gaps.

FIG. 3 shows an isometric view of the mirror with breakout views showing details of the pattern of perforations.

DETAILED DESCRIPTION OF THE INVENTION

The mirror may be formed from polished metal such as stainless steel, well known in some security mirror products. It is however required for the present uses that the mirror be partially transparent. Referring to FIG. 1, the mirror 111 is, therefore, preferably formed from perforated stock or may be

perforated as part of the forming process (by punching) or after forming (as by drilling). The mirror 111 has a convex surface 100 and a concave surface 101. A plurality of perforations 110 pass completely through the mirror. Such a mirror 111 can be painted (or otherwise finished) matte black on its concave side to suppress unwanted reflections. This is a valuable structure for many uses of the diverse embodiments and of the patents incorporated herein by reference. Not only are miscellaneous reflections suppressed, but the ability of the concave side to focus collimated light, particularly sunlight, is obviated. Mirrors of diverse materials can be manufactured by ordinary means to take advantage of these benefits of perforated mirrors. Plastic mirrors can, for example, be cast with perforations.

Although preferred, it is not necessary for the concave side to be black in order to be useful. To accomplish the purpose of suppressing the ability of the mirror to focus light to a hot spot, almost anything but a specular concave surface is useful. Miscellaneous reflections may also be substantially suppressed with even a white surface.

The mirror may be optically, rather than physically perforated, as by coating, by means well known in the art, a single surface of a transparent substrate with a pattern in two layers, one being a specular coating, the other non-specular. The coatings are preferably applied on the concave side of the substrate, the specular coating being applied first. This is shown in FIG. 2. Mirror device 222 is formed from an optically transparent material, and has a convex surface 200 and a concave surface 202. In the embodiment shown in FIG. 2, the transparency is interrupted on the concave surface by a coating pattern 220. The intermittent transparency and opacity created by pattern 220 renders the transparent portions or gaps as optical perforations capable of transmitting images. The coating pattern 220 consists of two layers -- a reflective layer 22 deposited directly onto the concave surface, and a non-specular layer 20 deposited onto layer 22. In this embodiment, a viewer observing the convex surface will see a reflective or mirrored pattern interrupted by the perforations. A

viewer observing the concave surface will see an opaque pattern interrupted by the optical perforations.

The optical perforations can be formed by applying a resist, such as is known in the art, to the substrate prior to coating or by removing portions of the coating by ordinary means know in the art. The resist can be applied in a useful pattern by screen-printing, spraying, or by other ordinary means. Coating removal can be accomplished with known solvents. It is also possible to apply perforated, including optically perforated, thin films to transparent substrates, before or after forming.

The size and spacing of the perforations is determined with reference to the specific requirements of the application. Most useful embodiments will employ staggered rows of circular perforations, the perforations taking up approximately fifty percent of the mirror area. The perforation size is preferably near the limit of visual acuity (ordinarily one minute) for a viewer at the design distance.

FIG. 3 is an isometric view of mirror 111. It comprises convex surface 100 and concave surface 101. The perforation pattern, shown in the breakouts, is comprised of perforations 110.

While the Invention has been described with reference to preferred embodiments thereof, it will be appreciated by those of ordinary skill in the art that modifications can be made to the Invention and to its uses without departing from the spirit and scope thereof.